

Appl. No. 09/629,245  
Amdt. dated 1/26/2004  
Reply to 11/10/2003 Office action

### REMARKS

This is in response to the Office action dated 11/10/2003 objecting to the drawings, and claims 10, 19, 21, 25, 28 - 31, 35, 38, 41, 42 and 44, and rejecting claims 1 - 9, 11 - 18, 20, 22 - 24, 26, 27, 32 - 34, 36, 37, 39, 40, and 43. More specifically, the Office action rejected claims 1 - 3, 6, 11 - 18, 20, 22 - 24, 26, 27, 32 - 34, 36, 37, 39, 40, and 43 under 35 USC 102 as being anticipated by Nayar et al U. S. Patent No. 4,912,336, and rejected claims 4, 5, and 7 - 9 as being as being unpatentable over Nayar in further view of Chang et al U. S. Patent No. 6,137,896.

With regard to Nayar, Nayar discloses an apparatus that measures "image intensity values" which are then inputted into an extraction algorithm "to locally estimate orientation and reflectance information." See col. 2, lines 46 - 48, where the reflectance information includes Lambertian and specular components. The intensity values are mathematically represented by equations 2 or 6, and equation 7, specifically the Lambertian component of image intensity is given as:  $IL = A \cos(\theta_s - \theta_n)$ , and the specular component of image intensity is given as:  $IS = B L_i(2\theta_n)$ . The equations for IL and IS show that intensity is a function of the source direction  $\theta_s$ , the surface orientation  $\theta_n$ , and the relative strengths of the Lambertian, A, and specular, B, components of reflection, see col. 7, lines 30 - 36, col. 5, lines 15 - 17 and 29 - 32, col. 8, lines 28 - 30, and Fig. 2.

These equations in Nayar are purely intensity equations, there is no frequency component to these equations. Nayar is not measuring frequency with these equations. Nayar simply measures the intensities. The equations in Nayar relate the measured intensity to orientation, but only orientation - not frequency.

Further, Nayar does not disclose or suggest the intensities be transformed or translated into anything, let alone frequency content.

Nayar does mentions frequency, in the sampling section, see column 7, lines 62 - column 8 lines 20. Specifically, Nayar samples the intensity values it measures at the minimum sampling frequency as shown in Fig. 5. If one using the method of Nayar gets many intensities to evaluate, which is many intersections of the curve in Fig. 5, then  $1/f_{\min}$

Appl. No. 09/629,245  
Amdt. dated 1/26/2004  
Reply to 11/10/2003 Office action

is small and  $f_{\min}$  is big. For less intensity measurements to evaluate, the interval  $1/f_{\min}$  is big, where  $f_{\min}$  is small.

The sampling frequency mentioned, however, is not concerned with the frequency content of the image simply at what points should the measured intensity values should be evaluated. Nayar explains why it samples the intensities at an interval dictated by the minimum sampling frequency, so that "it is ensured that only two consecutive image intensities in the intensity set contain non-zero specular components of intensity." column 8, lines 44 – 48. This is all Nayar is concerned with, Nayar is not concerned with the frequency content of the image.

In contrast, independent claim 1 has as a necessary element a frequency response of the intensity image, where a frequency response, as known in the art, is a response to more than one frequency, and the frequency response of an image is, for example, one that may be generated from a transformation or convolution. Specifically, claim 1 claims at least a portion of a two-dimensional frequency response of the intensity image.

Nayar and claim 1 are not disclosing the same thing. Nayar calculates the intensity of the image, and chooses to sample the intensity at an interval dictated by the minimum sampling frequency. In contrast, claim 1 generates a frequency response of an image.

Unlike claim 1, Nayar does not translate or transform the intensity values to frequency values, nor does Nayar use more than one frequency. Thus, Nayar cannot be said to cannot be said to teach the frequency response of claim 1.

Independent claims 23, 32 and 39 recite the same limitation, .i.e. a frequency response. Therefore for the same reasons given above, Nayar does not anticipate claims 23, 32 and 39, and thus, the rejections to claim 23, 32 and 39 under 102 as being anticipated by Nayar are deemed to be overcome.

With regard to claims 2 – 3, 6, 11 – 18, 20, 22, 24, 26, 27, 33 – 34, 37, 40, and 43 they depend from claims 1, 23, 29, 32 and 39, respectively, and therefore are likewise not anticipated by Nayar. Therefore, the rejections to dependent claims 2 – 3, 6, 11 – 18, 20, 22, 24, 26, 27, 33 – 34, 37, 40, and 43 under 102 as being unpatentable over Nayar are deemed to be overcome.

Second, the Office action rejected claims 4, 5, 7 – 9 under 35 USC 103 as being unpatentable over Nayar in view of Chang. As claims 4, 5, and 7 – 9 depend from claim 1,

Appl. No. 09/629,245  
Amdt. dated 1/26/2004  
Reply to 11/10/2003 Office action

which claims applicant deems allowable, claims 4, 5, and 7 - 9 are likewise allowable and the Office action rejection to those claims under 35 USC 103 as being unpatentable over Nayar in view of Chang is deemed moot, and thus, overcome.

New claims 45 - 54 do not add new matter, see specification page 17, lines 13 - 29, and page 13, lines 16 - 20 and page 14, lines 19 - 23, for example. Furthermore, the new claims depend from the claims 1, 23, 32, and 39, which claims Applicant deems allowable. Thus, Applicant contends that new claims 45 - 54 are also allowable.

All the amendments to the original claims were made to correct informalities and not in response to the Office Action.

Accordingly, Applicant respectfully requests entry of the above amendment, and respectfully requests allowance of claims 1 - 54. The Examiner is invited to telephone the undersigned attorney to further the prosecution of this application.

Respectfully Submitted,



Tracy M. Calabresi, Registration No. 38,920  
Attorney for Applicants  
7 Eldridge Road  
Harvard, MA 01451  
Phone: 978-456-8840